

CLAIMS

1. Method of controlling the glass gob mass in the production of hollow glass containers by means of a glass forming machine (36), wherein at least one plunger (2,2') is disposed in a feeder head (3) of a feeder (4) and in order to move the at least one plunger (2,2') vertically upwards and downwards a movement profile (A,B,C,D) is provided which can be changed in order to influence the discharge of molten glass from the feeder head (3),

characterized in that the glass forming machine is an IS (Individual Section) glass forming machine (36) and for the simultaneous production of an assortment of hollow glass containers of a different weight a changeable movement profile (A,B,C,D) for each plunger (2,2') is provided for each section (36) of the IS glass forming machine,

a mass reference value difference is determined from a mass reference desired value and a measured mass reference actual value on the basis of at least one of consecutive gobs for each preform station (35) of each section (36),

in dependence upon the determined mass reference value difference for each preform station (35) the associated plunger movement profile (A,B,C,D) is changed in such a manner that by virtue of subsequent repetition of the determination of the mass reference value difference with subsequent change to the movement profile (A,B,C,D) the mass reference actual value is approximated stepwise to the mass reference desired value.

2. Method as claimed in claim 1,

characterized in that after each completed machine cycle a check is carried out for each preform station (35) to verify whether the mass reference value difference is above a threshold value and if this is the case the plunger movement profile (A,B,C,D) is adapted for the preform station (35).

3. Method as claimed in claim 1 or 2,

characterized in that the standstill period (85,86) of the plunger (2,2') is changed in its lower (y1;yc1,yd1) and/or upper (y2) end position.

4. Method as claimed in any one of the preceding claims,

characterized in that the duration (87,88) of the downwards and/or upwards movement of the plunger (2,2') is changed.

5. Method as claimed in any one of the preceding claims,

characterized in that the speed structure of the downwards and/or upwards movement of the plunger (2,2') is changed.

6. Method as claimed in any one of the preceding claims,

characterized in that the plunger stroke (98,98',98'',99,99',99'') is changed.

7. Method as claimed in any one of the preceding claims,

characterized in that the position (98,98',98'',99,99',99'') of the plunger stroke relative to an orifice ring (6) of the feeder head (3) is changed.

8. Method as claimed in any one of the preceding claims,

characterized in that at least one substantially horizontally extending plunger holder (22) is provided and each plunger movement profile is determined by a data record for an associated movement profile (A,B,C,D) of the plunger holder (22).

9. Method as claimed in claim 8,

characterized in that in the presence of several plungers (2,2') for each section (36), in addition to the respective data record for the plunger holder (22) or the data records for the plunger holders (22), except for a first plunger (2), for each of the plungers (2') a

data record for a profile (99,99',99") is provided to move the plunger (2') relative to its plunger holder (22).

10. Method as claimed in any one of the preceding claims,

characterized in that if, in addition, the axial position of a restrictor pipe (7) of the feeder head (3) is regulated in order to compensate for the effects of changes in the viscosity of the molten glass or changes in the glass level (17, 18) in the feeder head (3) upon the mass of the glass containers to be produced, a real mean value is formed from the mass reference value differences of all gobs of a machine cycle and this mean value is approximated to the value zero by changing the axial position of the restrictor pipe (7) between two respective cycles and furthermore, the mass reference value differences are scaled in such a manner that a fictitious mean value of zero is produced from the scaled mass reference value differences and the change in the plunger movement profiles (A,B,C,D) is performed on the basis of the scaled mass reference value differences.

11. Device (1) for controlling the glass gob mass in the production of hollow glass containers by means of a glass forming machine (36), comprising at least one plunger (2,2'), which is disposed in a feeder head (3) of a feeder (4), and means (22,23,26) for moving the at least one plunger (2,2') upwards and downwards, wherein a movement profile (A,B,C,D) for the plunger movement is stored in a control unit (71) of the device (1), said movement profile being changeable in order to influence the discharge of molten glass from the feeder head (3),

characterized in that the glass forming machine is an IS (Individual Section) glass forming machine (36) and for the simultaneous production of an assortment of hollow glass containers of a different weight a changeable movement profile (A,B,C,D) for each plunger (2,2') can be stored in the control unit (71) for each section (36) of the IS glass forming machine,

the device (1) comprises means (67) to determine a mass reference value difference from a mass reference desired value and a measured mass reference actual value on the basis of at least one of consecutive gobs for each preform station (35) of each section (36),

and the control unit (71) is connected via a data line (72) to the means (67) for determining the mass reference value difference and is designed, in dependence upon the determined mass reference value difference for each preform station (35), to change the associated plunger movement profile (A,B,C,D) such that by virtue of subsequent repetition of the determination of the mass reference value difference with subsequent change to the movement profile (A,B,C,D) the mass reference actual value is approximated stepwise to the mass reference desired value.

12. Device as claimed in claim 11,

characterized in that the device (1) is designed, after each completed machine cycle to carry out a check for each preform station (35) to verify whether the mass reference value difference is above a threshold value and if this is the case, to adapt the plunger movement profile (A,B,C,D) for the preform station (35).

13. Device as claimed in claim 11 or 12,

characterized in that the device (1) is designed to change the plunger movement profiles (A,B,C,D), by changing one parameter or several parameters in combination with each other from the group consisting of standstill period (85,86) of the respective plunger (2,2') in its lower (y1;yc1,yd1) and/or upper (y2) end position, duration (87,88) of the downwards and/or upwards movement of the plunger (2,2'), speed structure of the downwards and/or upwards movement of the plunger (2,2'), plunger stroke (98,98',98'',99,99',99'') and position (98,98',98'',99,99',99'') of the plunger stroke relative to an orifice ring (6) of the feeder head (3).

14. Device as claimed in any one of claims 11 to 13,

characterized in that the device (1) comprises at least one substantially horizontally extending plunger holder (22) and each plunger movement profile is determined by a data record, which is stored in the control unit (71), for an associated movement profile (A,B,C,D) of the plunger holder (22).

15. Device as claimed in claim 14,

characterized in that all of the plungers (2,2') are jointly attached to a plunger holder (22) and the control unit is a drive controller (71) of the plunger holder (22).

16. Device as claimed in claim 14 or 15,

characterized in that the device (1) comprises several plungers (2, 2') and for each section (36) in addition to the respective data record for the plunger holder (22) or the data records for the plunger holders (22), except for a first plunger (2), for each of the plungers (2') a data record for a profile (99,99',99'') to move the plunger (2') relative to its plunger holder (22) by means of a height adjusting device (26) can be stored in an associated drive controller (71).

17. Device as claimed in any one of claims 11 to 16,

characterized in that if, in addition, a control circuit for the axial position of a restrictor pipe (7) of the feeder head (3) is provided for the purpose of compensating for the effects of changes in the viscosity of the molten glass or of changes in the glass level in the feeder head (3) upon the mass of the glass containers to be produced, the device (1) is designed to form a real mean value from the mass reference value differences of all gobs of a machine cycle and to approximate this mean value to the value zero by changing the axial position of the restrictor pipe (7) between two respective machine cycles and furthermore to scale the mass reference value difference in such a manner that a fictitious mean value of zero is produced from the scaled mass reference value differences, and to perform the change in the plunger movement profiles (A,B,C,D) on the basis of the scaled mass reference value differences.